

THE SMART CONTRACT – PROBLEMS WITH TAKING EVIDENCE IN POLISH CIVIL PROCEEDINGS IN THE LIGHT OF EUROPEAN REGULATIONS / Berenika Kaczmarek-Templin

JUDr. Berenika Kaczmarek-Templin,
PhD,
Department of Humanities
and Social Sciences,
Faculty of Management,
Wrocław University of Technology
and Science
Ul. Łukasiewicza 5,
50-367 Wrocław
Poland
berenika.kaczmarek@pwr.edu.pl
ORCID: 0000-0003-2731-7430

Abstract: *In recent years, we have observed an amazing development of new technologies; many contracts come into effect without paper documents being signed. New possibilities have appeared, for example, the smart contract (also known as the digital contract or blockchain). In some cases, there is a dispute between the participants in the smart contract, e.g., as to the manner of its implementation. A court case might be necessary to resolve the dispute. As in any dispute, evidence proceedings will have to be conducted. The smart contract should appear as a proof. However, due to its unusual nature and complicated status under substantive law, as well as the fact that it is produced by new technological solutions, it is essential to determine its admissibility as evidence. The procedural law regulates in detail only traditional evidence. The smart contract has not been regulated in procedural regulations, therefore, its status needs to be established in the context of the existing documentary evidence. This article aims to contribute to the discussion on the status of smart contracts in civil court proceedings. Primarily, it should be determined whether the smart contract can be considered a document within the meaning of procedural law. In the Polish legal system, the document is defined as an information carrier whose content can be read. Accordingly, the smart contract meets the definition criteria. However, in the absence of provisions governing the manner of taking documentary evidence, it may be difficult to actually take such evidence and establish its value. The article also draws attention to Regulation (EU) No 910/2014 of the European Parliament and of the Council on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93 / EC. Its art. 46 refers to the legal effectiveness of electronic documents and prohibits discrimination against evidence from such documents, which should undoubtedly contribute to the acceptance of a smart contract as evidence in civil proceedings.*

Key words: *Smart Contract; Civil Procedure; Evidence; Document; Polish Civil Law; Polish Jurisdiction; European Law*

Suggested citation:

Kaczmarek-Templin, B. (2023). The Smart Contract – Problems with Taking Evidence in Polish Civil Proceedings in the Light of European Regulations. *Bratislava Law Review*, 7(1), 65-76. <https://doi.org/10.46282/blr.2023.7.1.308>

Submitted: 15 October 2022

Accepted: 13 April 2023

Published: 30 June 2023

1. INTRODUCTION

Over the last few years, we have been observing an unceasing development of technical tools in the field of data transfer and in the speed of data processing. In addition, mobile devices and applications are becoming more and more widespread. We are witnesses to a digital revolution that affects a large number of social and economic relations, including all kinds of legal interactions (Kasprzyk, 2018, pp. 101-118).

One crucial digital technology connected to the law is the blockchain. When it comes to the blockchain, people often think of virtual currencies such as Bitcoin (BTC) and Ethereum (ETH). In fact, virtual currency is the most popular application of blockchain technology. In fact, the technology can be applied in various domains, one of them being blockchain-based smart contracts (Luu, Chu, Olickel, Saxena, and Hobor, 2016, p. 254).

Due to the fact that more and more often smart contracts are used to carry out commercial transactions, they may consequently be presented in court. In a situation where the parties to a contract cannot agree on its implementation, their dispute usually ends up in court. The court, when conducting proceedings related to the smart contract, will have to verify it. Due to the fact that the law usually lags behind the development of new technologies, there are currently no provisions that would directly refer to the status of a smart contract as evidence. The article attempts to determine the admissibility of the smart contract as evidence and its qualification as a means of evidence in civil procedure. In particular, it should be considered whether the smart contract can be classified as a document according to the statutory definition. If so, the possibility and legitimacy of applying all the procedural norms that regulate documents must consider the smart contract. Due to the extremely complicated nature of the smart contract, this article is meant to start proper considerations of its status, and aims to draw attention to the issue associated with taking evidence from the smart contract.

2. THE IDEA OF THE SMART CONTRACT

The concept of the smart contract was first introduced in 1994 by the computer scientist and legal scholar Nick Szabo. The researcher visualised a digital economy where two parties would enter into a contract in which they would not be worried about the problem of 'trust.' According to the author of the term, the smart contract is a set of promises defined in a digital form, including protocols under which the parties fulfil these promises (Szabo, 1996).¹

When evaluating this development, one should not forget that the idea of the smart contract had existed before. The vending machine can be treated as a prototypical smart contract implementation. The machine itself is the offer. When someone inserts money into the machine, the offer is accepted; a contract is formed and concluded. Transfer of ownership takes place automatically: A drink or a snack is sold. The vending machine executes and enforces the smart contract, even without the use of particularly sophisticated technology (Kasprzyk, 2018, p. 116).

Smart contracts are believed to have great potential for development and they will probably attract interest of the international community due to their transparency, reliability, and certainty, as well as their low cost. Smart contracts can be used in various fields such as finance, banking, supply chain, healthcare, education, transportation, and many others.

¹ See also Kõlvart, Poola, and Rull (2016, p. 133), and Lauslahti, Mattila and Seppälä (2017).

The smart contract is essentially a computer program based on a simple rule: 'If X happens, do Y'. Buying an apartment may be a real-life situation in which the principle of smart contracts can be applied. After the payment is made, an appropriate entry is automatically written, which changes the ownership of the property in the virtual land and mortgage register (granted it is recorded in a specific transaction on the register stored in the blockchain). At the same time, the vendee receives an access code to the apartment, and without having to deal with unnecessary formalities in any offices, he can move in.

2.1 Smart Contract as a Legal Contract

Smart contracts may be stored on a blockchain or in a differently distributed ledger technology. They are structured by means of code. A given code carries particulars of the intended transaction, which is typical of transfer of information, thus establishing the smart contract (Christidis and Devetsikiotis, 2016, p. 2293). The smart contract should be understood as a contract in the form of a computer program with defined self-executing terms of implementation.

The legal literature on the issue of smart contracts is extremely rich and due to the variety of legal systems, it is not possible to discuss all points of view (see Savelyev, 2016; Idelberger, 2018; Tjong Tjin Tai, 2017; Catchlove, 2017). The vast majority of voices in the legal doctrine concern the status of the smart contract in the substantive civil law and, above all, considerations focus on the inability to qualify it as a contract.²

Essentially, the smart contract can exist without any legal system that regulates it, being expressed in the language of mathematics, a technological alternative to the traditional contract, according to the phrase 'the code is the law' (Lessing, 1999, p. 3; Weber, 2018, pp. 701-706).

On the other hand, this kind of position is hard to accept, as it would exclude virtual reality from the legal system and its regulations. This is why attempts are being made to translate the language of the smart contract into the legal language, which is to stimulate the reverse process to the algorithmisation of the basic institution of the legal and market system (the contract) (Pecyna and Behan, 2020, pp. 187-217).

From a legal perspective, a contract is an agreement between parties that gives rise to a legal effect, in particular a binding legal relationship. Smart contracts are seen as a new form of arrangements comparable to contracts although written in a source code (di Angelo, Soare and Salzer, 2019; Raskin, 2017, pp. 305-341; O'Hara, 2017, pp. 97-101). It is worth highlighting that the terms of smart contracts are recorded in a computer language instead of the legal language, which is a kind of natural language after all.³

There are concepts showing that the smart contract is an agreement within the meaning of the so-called classical civil law. To justify such a view, the purpose of using the smart contract to conclude a transaction is indicated, on the basis of which property rights to digital goods are usually transferred within the blockchain. Although the implementation of the smart contract is automatic, the supporters of the above concept

² See Legal and Regulatory Framework of Blockchains and Smart Contracts. A thematic report prepared by the European Union Blockchain Observatory and Forum, 27.09.2019. Available at: https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf (accessed on 10.03.2023).

³ Distributed Ledger Technology: beyond block chain. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf (accessed on 18.09.2022).

point out that we are dealing with declarations of will, which can be equated with a decision to use the smart contract and exercising the will to be bound by its operation.

It should be emphasised that declarations of intent that make up a contract must relate to its content and express the will to produce legal effects. The contract itself is created when the parties make declarations of will.

In the case of the smart contract, there are no such statements. Parties to a smart contract may even be anonymous to each other, and the performance of the contract itself is often dependent on a third party, who does not act on behalf of the parties but only performs a technical activity without which it would be impossible to run the contract.

The smart contract itself is not a legal contract, unless it meets the requirements of the contract law. If the parties intend to be legally bound and reach a sufficient agreement, specific principles of contract law shall provide for the conclusion of a 'legal' smart contract.

The smart contract is a specific means of contract performance. It may be concluded and executed only in electronic form. The provisions of the smart contract are made up of code (computer program), and the smart contract itself has a double nature: on the one hand, it is a kind of 'form' covering the content of the relationship between the parties, and on the other hand, being a computer program (code), as such it is an object protected by intellectual property law.

The smart contract as such is not a contract and should not be equated with a contract in the legal sense. On the other hand, the smart contract can be considered as a way of concluding and (self-)performance of the contract, provided that this is its purpose and the content of the code. It can also be a method of performing a contract concluded in a different way.

N. Szabo (1997) believed that smart contracts involve all contractual phases: search, negotiation, commitment, execution, and adjudication. Smart contracts are functionalities that aim to minimise transaction costs that result, among other things, from conclusion, breach, default, or enforcement.

In the Polish legal system, currently, there is no specific legal framework for smart contracts, which could be directly applied, or on the basis of which its specific normative qualification could be made. Therefore, it should be stated that the mere use of blockchain functionalities in legal transactions is fully legal in accordance with the concept that everything which is not forbidden is allowed.

The question arises: Can existing law be applied to smart contracts, or do we need to revise the current legal system to regulate the smart contract? This issue can also be extended to the level of procedural law, and this article is an attempt to discuss the admissibility of the smart contract as evidence of a transaction made by the parties in this technology.

Basically, due to the nature of the smart contract, it is difficult to find a common intention of the parties or any doubts as to interpretation that could be resolved in favour of one party.

The use of the smart contract is actually related to the presumption of clarity of the content of the contract. Consequently, the admissibility of determining a meaning other than that resulting from the code could be excluded, and thus the possibility of conducting evidence for this circumstance could be excluded. This presumption could be undermined if the parties are identified and have concluded a contract in the traditional sense, and the smart contract was used to conclude the contract, but there was an error in the software. In this case, the smart contract will carry out the transaction that will be inconsistent with the will of the parties.

However, in some particular cases, the parties try to challenge a smart contract, and then it is necessary to bring an action before a competent court. The court will then attempt to evaluate the smart contract in question.

A smart contract may be subject to court examination if there is an error in its code, and thus the smart contract is implemented contrary to the will of its participants. If such a situation occurs, the responsibility of the programmer who prepared the code will have to be determined.

As a rule, contracts are basic types of evidence. In the case of the smart contract, it could be difficult to question its authenticity and the conditions agreed. In particular, the conditions under which the contract was prepared will need to be considered. The smart contract has not been regulated in procedural regulations, so it will be necessary to establish its status in the context of existing documentary evidence.

3. TYPES OF EVIDENCE

In Polish civil proceedings, anything can become evidence as long as it is relevant to the outcome of a court case. The civil procedure code regulates in detail five means of proof normally used, including documents (official and private), witness testimony, expert opinion, inspection, and examination of parties. These types of evidence are also known in other national European procedures.

The document is one of the most common means of evidence that appears in civil proceedings. It is created by consciously and purposefully recording and transmitting specific information with the use of specific marks. Until recently, the Code of Civil Procedure limited the concept of a document to a written document, that is, one in which legal significance is preserved by means of writing. One more kind of evidence can be distinguished, namely one that combines features of a regular document and other objects. This category includes film, photocopy, photography, plans, drawings, records, tapes, and other devices used to record or transmit sound and images. Appropriate application of the provisions on documentary evidence, when it comes to documents of combined features, results, *inter alia*, from the faithfulness of their reflection of the indicated fragments of reality (especially in the case of video evidence).

For a long time, no definition of the document had been introduced; yet, the provisions of the civil law, both procedural and substantive, were in force. However, the lack of provisions did not prevent the practical application of documentary evidence in actual proceedings.

For theoretical considerations, attempts have been made to define the document. It appears that the provisions on the types of documents and presumptions related to them allowed efficient evidence collection and determination of its probative value. The only drawback, recognised in the doctrine, was the attachment to the paper form or the written form.

In the pre-war literature, there was a conviction that documents could be various movable objects with some content (documents in broad sense), and in the post-war literature, the dominant view was that a document should be made in writing (documents in narrow meaning).

Regardless of the definition adopted, an item to be qualified as a document must have two features. First, it must carry a specific message (thought, intention), presented in understandable characters (e.g., alphabet, numbers, or other signs), and it must be recorded in such a way that it can be reproduced repeatedly in the future. Contested elements, such as signature or date, are not essential for its existence, but can only affect its probative value.

The amendments to the Code of Civil Procedure and the Civil Code, which entered into force on September 8, 2016 introduced many changes, among others, with regard to documentary evidence. According to the postulates appearing in the legal literature, the definition of a document was introduced for the first time in the history of Polish civil law. It follows from the justification of the draught act that the introduction of a statutory definition of the document will help, *inter alia*, achieve organisational objectives by standardising this concept.

The adopted definition of the document means accepting the broad understanding of this term, according to which the main function of documents is to record certain observations or statements in order to present them in a documentary form in the future. It means abandoning the traditional written form (as the only form) in favour of other methods of collecting and storing information, such as electronic records. It is a solution consistent with social expectations and in line with the degree of technological development (Kaczmarek-Templin, 2012, pp. 18-59).

3.1 Legal Definition of the Document

In the Polish legal system, the definition of a document has been introduced as an information carrier whose content can be read (Art. 77³ Civil Code).

The location of the definition of 'document' in the Civil Code can raise doubts as to whether it should also apply to the Code of Civil Procedure. So far, the document within the meaning of substantive civil law and the document within the procedural law have not been identical concepts. However, the justification of the amendment to the act in question shows that the appearance of a definition in substantive law entails applying it appropriately in procedural law. Basically, the Code of Civil Procedure does not contain any definitions or glossaries of terms, which also justifies the claim that the definition should indeed be placed in the Civil Code, especially in the context of the regulations contained therein regarding declarations of will as well as knowledge and forms of their manifestation.

However, in accordance with the guidelines contained in the justification of the act introducing the changes in question, in light of the definition of the term 'document' proposed in the provisions of the Civil Code, a distinction should be made between documents containing text, that is, drawn using alphabetic characters and linguistic rules, and other documents. The provisions of Art. 244 of the Code of Civil Procedure *et seq.* apply to documents containing text, while to the other refers Art. 308 of the Civil Procedure Code.

The literal wording of the definition is as follows: the document covers any material substrate that represents any cognitive value. It includes information transmitted electronically, sound waves, light signals, smoke signs, as well as objects or phenomena carrying any information; for instance, an excavated object is a carrier of information about historical facts, an atmospheric phenomenon is a carrier of information about weather conditions, while the DNA code is the carrier of information about the genotype of an organism. Such a broad approach to the document is reflected in the regulations of the Civil Procedure Code (Kaczmarek-Templin, 2021, pp. 1066-1097).

It follows from the justification of the Amendment Act that the legislator adopted 'durability' as an integral element of the document; however, the wording of the provision does not directly allow drawing such a conclusion. It seems that on procedural grounds such an interpretation should be postulated. Also, in the earlier legal status, an important feature of the document was the articulation of a thought or information that allows for later multiple use.

There are technical possibilities for recording data on biological data carriers, which, due to their definition, should be treated as documents. On the other hand, it is commonly believed that biological data carriers will not have the status of documents and will not appear as such in civil proceedings. A good example may be the information stored in the DNA structure of *Deinococcus radiodurans*. In the genetic code of these bacteria, a short song text has been encoded, which is appropriately titled *It's a small world* (Cox and Battista, 2005, pp. 882-892). The bacteria multiplied, and the data remained unchanged. Taking into account the definition, it is also a document; however, it is unlikely that such evidence is unlikely to appear in civil procedure.

The doctrine assumes that the document consists of a material substrate (in the form of a carrier) and intellectual content (information), provided that both elements must appear together. The literal meaning of Art. 77³ of the Civil Code does not provide grounds for drawing such a conclusion. However, this view has been established.

Despite introducing the definition of the document to the Civil Code and significantly broadening its meaning, the method of taking documentary evidence and its evidential value is still subject to ambiguity (Kaczmarek-Templin, 2021, p. 1197). Under the new definition (and in line with the intention of the legislator), the document covers all creations containing information recorded in electronic form. It should be borne in mind that an electronic document has a non-uniform nature. It includes various types of computer files containing graphic data, acoustic (audio) data, multimedia (video) data, and also software (Kaczmarek-Templin, 2012, p. 22).

Electronic documents have gained importance in recent years. A computer program was first mentioned as a document in the German legal literature (Zöller, 2004, § 371). While a few years ago it was difficult to imagine such a form of a document, now, especially with the emergence of the smart contract, it seems that the definition of a document rightly includes computer programs (codes).

The view expressed by the Polish Supreme Court is worth mentioning here, according to which the provisions of the Code of Civil Procedure make it possible to use all the achievements of technical progress as long as it is allowed by the law.⁴ Although that judgement was announced in the late 1960s, it is still up to date and can provide the basis for treating any manifestation of technology as evidence. Currently, smart contracts may be treated as this kind of achievement.

Generally speaking, the smart contract meets the definition criteria of the document. However, in the absence of provisions governing the manner of taking such evidence, it may be difficult to actually take such evidence and establish its value.

3.2 Taking Evidence of the Smart Contract

As can be seen, there are no obstacles to accepting the smart contract as a document.

The smart contract is placed on a decentralised blockchain, which means that no changes to the contract can take place without the other network participants being notified. The information placed in a given block must be encrypted using private and public keys. The private key is used to create a digital signature, while the public key is used to verify it, that is, it allows us to verify the authenticity of the information. Once a transaction has been saved, it remains in the block forever; the register cannot be re-edited.

⁴ Polish Supreme Court Judgement of 15.4.1969, III PRN 20/69.

Remarkably, the contract is a kind of 'strong' evidence. The main reason for that is its fixed content; therefore, no modifications to the contract are possible. Technically speaking, the contract cannot be modified in any way. If the parties want to change anything, they have to encrypt a new smart contract.

The parties cannot easily deny the content or say that the contract has different content compared to the smart contract offered as evidence in the proceedings. If a party questions the authenticity of the contract, it is worth consulting an expert about any possibility of interference by third parties or any errors in the computer code. However, an expert does not have to be consulted; it depends on the circumstances of the case. Usually, determining whether a smart contract has been modified will be easy even for someone who is not proficient in computer science. There will be no need to hire someone who has experience in this regard. An expert may be required when it is crucial to obtain more detailed findings, including, for example, determining the existence of errors in the code or trying to verify the identity of smart contract users.

What can be challenging and difficult for the court in taking evidence of the smart contract is that special equipment, hardware and software, may be required. If the court does not have the technical capabilities to read the smart contract during the hearing, the parties ought to present how the contract is formulated.

According to the Polish legal procedures, the court can request an expert to assist the court not only with their expertise, but also with special equipment if it is necessary for taking evidence (Kaczmarek-Templin, 2012, pp. 195-197).

Electronic evidence can generally be presented in three forms, i.e., as data stored on information carriers (hard or portable disk, pendrive, CD), as a visualisation on a computer monitor, or as a computer printout. However, there is no doubt that one should adopt a concept that considers captured electronic data to be electronic evidence. The projection of a document on a computer screen and its printout are only exact representations of the records and only when the representation is in line with the nature of the record (Kaczmarek-Templin, 2012, p. 34).

Nevertheless, taking evidence may require reading it either on the screen of a computer operated by the court or on a computer remaining at the party's disposal. It has not been decided whether a party must also provide the other party with the device, e.g., a mobile phone, on which electronic evidence is stored. However, for the purpose of the proceedings, the party should allow the court and the other party to familiarise themselves with the evidence.

The party at whose disposal the smart contract will be may be obliged by the court to make it available to the court within a specified time under the burden of omitting such evidence. The court will assess the possible refusal to make it available accordingly. If necessary, the party may also be required to make it available to an expert.

4. EUROPEAN REGULATIONS

The national legislator decided to equate traditional documents and electronic documents, creating a general definition that covers both categories and is included in the Civil Code, instead of the Code of Civil Procedure, which seems to be a more natural place for it. In the European regulations, there is no specific legal framework on smart contracts (Bierekoven, Bazin, and Kozłowski, 2004, pp. 7-13; Polański, 2015, pp. 773-781; Nguyen, 2018, pp. 424-428). Nevertheless, it is worth paying attention to Regulation (EU) No. 910/2014 of the European Parliament and of the Council on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93 / EC (eIDAS regulation) and its preamble, from which it follows that

building trust in the online environment is key to economic and social development. Lack of trust, in particular due to a perceived lack of legal certainty, makes consumers, businesses, and public authorities hesitate to carry out transactions electronically and to adopt new services. The eIDAS regulation seeks to enhance trust in electronic transactions in the internal market by providing a common foundation for secure electronic interaction between citizens, businesses, and public authorities, thereby increasing the effectiveness of public and private online services, electronic business, and electronic commerce in the Union.

Art. 3 point 35 of eIDAS gives a definition of an electronic document, which should be understood as any content stored in electronic form, in particular text or audio, visual or audio-visual recording. This means, unlike in the case of the Polish definition of a document, that the content is the document, not the medium (data carrier). The smart contract also meets the requirements of this definition and therefore can be considered an electronic document.

Moreover, Art. 46 states that the legal effect of an electronic document or its admissibility as evidence in legal proceedings cannot be challenged solely on the ground that the document is in electronic form. Similar regulation applies to electronic signature, electronic stamp, electronic time stamp, and electronic registered delivery service.

In the provisions, we can also read that in order to contribute to the general cross-border use, it should be possible to use trust services as evidence in legal proceedings in all Member States. This involves the electronic signature, seal, and time stamp. In addition, it is pointed out that national laws must define the legal effect of trust services, except if otherwise provided in this regulation. These legal acts can indicate the direction and general concept of electronic evidence.

EU regulations can undoubtedly be the basis for recognising the effectiveness of smart contracts in court proceedings. It follows from them that it must be accepted as evidence if it is necessary to prove facts related to it. Therefore, national legislators cannot introduce any restrictions in this regard.

5. CONCLUSION

In summary, it should be emphasised that the smart contract is without doubt a kind of evidence that can be taken in the civil procedure. As far as taking evidence, it does not matter whether we qualify it as a contract in the classical sense of civil law or whether we deny it such status.

There are no limitations concerning smart contracts in the provisions, so, if necessary, the court must accept them. Acknowledging that the smart contract meets the criteria for the definition of the document would undoubtedly facilitate its acceptance as evidence in court proceedings. In the absence of detailed provisions for taking specific evidence, code provisions regarding other kinds of evidence should be applied *mutatis mutandis*. Any uncertainties will be resolved by adjudication. In the coming years, technology may create other possibilities for data storage, and smart contract will not be the only challenge for society and lawyers.

This view is also supported by the European law – eIDAS regulation, which clearly shows that to contribute to their general cross-border use, it should be possible to use trust services as evidence in legal proceedings in all Member States.

The smart contract within the meaning of procedural law should be treated as a document. Although such a position raises a number of problems and inconveniences related to the method of obtaining evidence, including those related to the confirmation

of authenticity, verification of content, and the method of delivery to the court, meeting the statutory criteria of a document is sufficient to recognise its status.

BIBLIOGRAPHY:

- Bierekoven, C., Bazin, P. and Kozłowski T. (2004). Electronic signatures in German, French and Polish law perspective. *Digital evidence and electronic signature law review*, 1, 7-13, DOI: <https://doi.org/10.14296/deeslr.v1i0.1719>
- Catchlove, P. (2017). Smart Contracts: A New Era of Contract Use. *SSRN Electronic Journal*. DOI: <http://dx.doi.org/10.2139/ssrn.3090226>
- Christidis, K. and Devetsikiotis, M. (2016). Blockchain and smart contracts for the Internet of Things. *IEEE Access*, 4, 2292-2303. DOI: 10.1109/ACCESS.2016.2566339
- Cox M. and Battista, J. (2005). *Deinococcus radiodurans* – the consummante survivor. *Nature Reviews Microbiology*, 3, 882-892. DOI: <https://doi.org/10.1038/nrmicro1264>
- di Angelo, M., Soare A. and Salzer, G. (2019). Smart Contracts in View of the Civil Code. In: *Symposium on Applied Computing*. New York: Association for Computing Machinery, 392–399. DOI: <https://doi.org/10.1145/3297280.3297321>
- Distributed Ledger Technology: beyond block chain. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf (accessed on 18.09.2022).
- Idelberger, F. (2018). Connected contracts reloaded – smart contracts as contractual networks. In: Grundmann S. (ed.), *European Contract Law in the Digital Age* (pp. 205-236), Cambridge–Antwerp–Portland: Intersentia. DOI: 10.1017/9781780686431
- Kaczmarek-Templin, B. (2012). *Dowód z dokumentu elektronicznego w procesie cywilnym*. Warszawa: C. H. Beck.
- Kaczmarek-Templin, B. (2021). Dowód z dokumentu. In: Ł. Błaszczak (ed.): *Dowody w postępowaniu cywilnym*. Warszawa: C. H. Beck.
- Kasprzyk, K. (2018). The concept of smart contracts from the legal perspective. *Review of Comparative Law*, 34(3), 101–118. DOI: <https://doi.org/10.31743/recl.4514>
- Kölvart, M., Poola, M. and Rull, A. (2016). Smart Contracts. In: Kerikmäe, T., Rull, A. (eds.): *The Future of Law and eTechnologies* (pp. 133-147), Cham: Springer. DOI: https://doi.org/10.1007/978-3-319-26896-5_7
- Lauslahti, K., Mattila, J. and Seppälä T. (2017). Smart Contracts – How will Blockchain Technology Affect Contractual Practices? *ETLA Reports*, No 68. Available at: <https://www.etla.fi/wp-content/uploads/ETLA-Raportit-Reports-68.pdf> (accessed on 18.09.2022).
- Legal and Regulatory Framework of Blockchains and Smart Contracts. A thematic report prepared by the European Union Blockchain Observatory and Forum, 27.09.2019. Available at: https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf (accessed on 10.03.2023).
- Lessing, L. (1999). *Code and Other Laws of Cyberspace*. New York: Basic Books, Inc..
- Luu, L., Chu, D. H., Olickel, H., Saxena, P. and Hobor, A. (2016). Making smart contracts smarter. In: *CCS '16: Proceedings of the 2016 ACM SIGSAC Conference on Computer and Communications Security*. New York: Association for Computing Machinery, 254–269. DOI: <https://doi.org/10.1145/2976749.2978309>

- Nguyen, K. (2018). Certification of eIDAS trust services and new global transparency trends. *Datenschutz und Datensicherheit*, 42(7), 424–428. DOI: <https://doi.org/10.1007/s11623-018-0972-7>
- O'Hara, K. (2017). Smart Contracts – Dumb Idea. *IEEE Internet Computing*, 21(2), 97-101. DOI: 10.1109/MIC.2017.48
- Pecyna, M. and Behan, A. (2020). Smart contracts – nowa technologia prawa umów? *Transformacje Prawa Prywatnego 2020*, No 3. Available at: <http://www.transformacje.pl/wp-content/uploads/2020/09/TPP-3-2020-Pecyna-Bechan.pdf> (accessed on 10.03.2023).
- Polański, P. (2015). Towards the single digital market for e-identification and trust services. *Computer law & security review*, 31(6), 773-781. DOI: <https://doi.org/10.1016/j.clsr.2015.09.001>
- Raskin, M. (2017). The Law and Legality of Smart Contracts. *Georgetown Law Technology Review*, 305, 305-341. DOI: <http://dx.doi.org/10.2139/ssrn.2842258>
- Savelyev, A. (2016). Contract Law 2.0: „Smart” Contracts as the Begging of the End of Classic Contract Law. *Higher School of Economics Research Paper No. WP BRP 71/LAW/2016*. DOI: <http://dx.doi.org/10.2139/ssrn.2885241>
- Szabo, N. (1996). Smart Contracts: Building Blocks for Digital Markets. *EXTROPY: The Journal of Transhumanist Thought*, vol. 16.
- Szabo, N. (1997). Formalizing and Securing Relationship on Public Networks. *First Monday*, 2(9). DOI: <https://doi.org/10.5210/fm.v2i9.548>
- Tjong Tjin Tai, E. (2017). Formalizing contract law for smart contracts. *Tilburg Private Law Working Paper*, No 6. DOI: <http://dx.doi.org/10.2139/ssrn.3038800>
- Weber, R. H. (2018). “Rose is a rose is a rose is a rose” – what about code and law? *Computer Law & Security Review: The International Journal of Technology Law and Practice*, 34(4), 701-706. DOI: <https://doi.org/10.1016/j.clsr.2018.05.005>
- Zöller, R. and Greger, R. (2004). *ZPO Kommentar*. Köln: Otoschmidt.

